

## **A. COVER SHEET**

### **Water Use Efficiency Program Proposal Solicitation Package**

1. Specify:                      agricultural project or                      individual or  
   urban project    joint application
2. Proposal Title:            **Subsurface Drip Irrigation for Home Lawns  
to partially address all of the CALFED Quantifiable Objectives**
3. Principal applicant:    **California Polytechnic State University  
Irrigation Training and Research Center**
4. Contact:                    **Dr. Stuart Styles  
Director**
5. Mailing Address:        **Dr. Stuart Styles - BRAE/ITRC  
Cal Poly State University  
1 Grand Avenue  
San Luis Obispo, CA 93407**
6. Telephone:                **(805)756-2429 (direct) (805)756-2434 (office)**
7. Fax:                         **(805)756-2433**
8. E-mail:                    **sstyles@calpoly.edu**
9. Funds requested:        **\$228,108**
10. Cost Share:              **Approximately \$45,500 from material donations**
11. Duration:                **July 2001 to June 2004**
12. State Assembly/Senate districts and Congressional Districts  
    where project is to be conducted:                      **Affects all portions within CA**
13. Location and geographic boundaries of the project:    **State of California**
14. Name and signature of official representing applicant. By signing below, the applicant declares  
    the following:
  - the truthfulness of all the representations in the proposal;
  - the individual signing the form is authorized to submit the application on behalf of applicant;
  - the applicant will comply with contract terms and conditions identified in Section 11 of the  
    PSP.

Dr. Stuart W. Styles

February 13, 2001

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## **B. SCOPE OF WORK**

### **1. Abstract**

Drip irrigation hardware and design practices have evolved over 30 years. There are several drip products available that can potentially provide excellent turf grass (lawn) irrigation. The most popular product for buried drip is GeoFlow, which uses a Treflan-impregnated emitter to prevent root intrusion. This product, manufactured and sold through Toro Irrigation, has been available commercially for about 10 years.

Some buried drip research on grass has been conducted, but it has almost exclusively been focused on large turf areas - parks, golf courses, and such. There has been almost no information available for home lawns. There is a very good reason for this - the installation equipment is designed for large systems. A tractor is required to pull some type of insertion tool in order to bury the hose. There are some very small slim trenchers available, but "slim" is a relative term, and about 20% of the lawn will be destroyed by the trenchers with the narrowest footprint. And these special trenchers are not available in most areas. The bottom line is that for an existing lawn at a home, there is no available hardware or procedure for easily installing SDI. Therefore, it is not used.

This proposal is to evaluate techniques to allow homeowners to install subsurface drip irrigation on existing lawns with minimal losses to the lawn.

### **2. Statement of Critical Issues**

- Home lawn irrigation systems probably have Distribution Uniformities of 50% or less, as estimated by Robert Walker of ITRC.
- It is very difficult to design a home lawn sprinkler irrigation system with a high uniformity because of odd lawn shapes and sizes.
- Home lawns use water that is:
  - expensive
  - scarce
  - treated
- Home lawns are important in our society from a psychological standpoint. But they also help to reduce heat reflection in urban environments (reducing home cooling energy needs during summer) and help to reduce noise levels by absorbing sounds.

- Home lawn irrigation probably represents the single largest consumer of water in most homes with yards.
- Water is exported from the Central Valley to the coastal communities (whether they be the Bay area, Santa Barbara, Los Angeles, or San Diego). When this water is used for irrigation, there is rarely any natural or artificial recycling of deep percolation or runoff. Therefore, any savings in water application will result in a true water savings to the state and the target areas identified by CALFED.
- Homeowner lawn water conservation has been very problematic in the past. That is, despite numerous water conservation programs, it is difficult to find efficient lawn irrigation at the homeowner level. Progress has been made in parks and golf courses, but at the home level there has only been marginal success. Part of the problem is the difficulty in designing efficient sprinkler systems, and part is due to management.

### **3. Nature, scope, and objectives of the project**

The injection equipment to be evaluated for this project will require 9-12 months to perfect. It is not a question of just being able to inject the hose; the way the soil surrounds the hose and emitter after injection will be an important factor in success. The mechanical engineering talents of numerous persons in the BioResource and Agricultural Engineering Department at Cal Poly will be very useful for the design and construction of this equipment.

We anticipate that water consumption will drop by 30-60% in a year. Part of the drop will be caused by improved uniformity, part will be caused by reduced evaporation from the grass surface, and part will be caused by an improved irrigation schedule during the year. We also expect this research to provide some surprises, as usually happens with homeowner irrigation projects. Obviously, we don't know what those will be.

### **4. Methods, procedures, and facilities**

Cal Poly ITRC is located in the Biological Resources and Agricultural Engineering Department. Shop facilities and equipment will be used to develop the installation equipment.

Cal Poly ITRC proposes a project with two aspects:

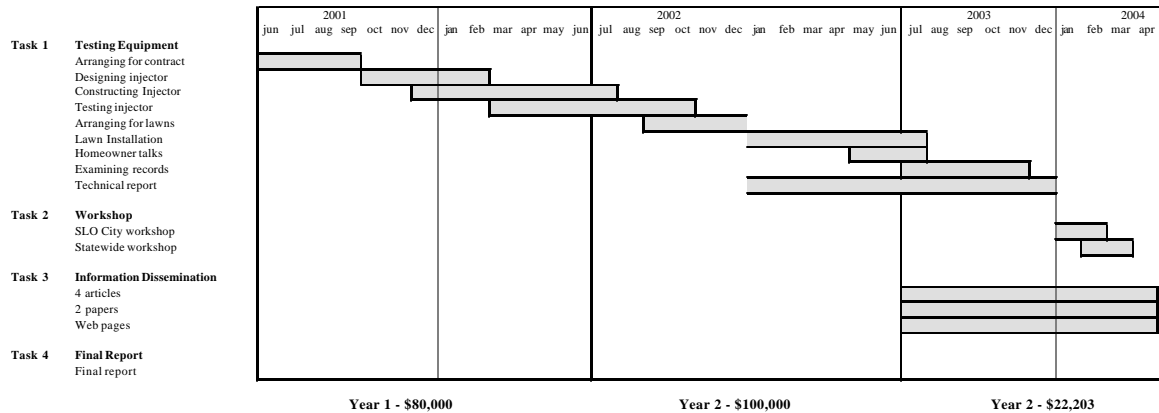
1. Installation equipment will be designed, built, and tested. This installation equipment must meet requirements of simplicity, portability, reasonably low price, and suitability for use by small landscape contractors on existing home lawns of variable sizes and shapes and surroundings. For example, tractors cannot be used because they cannot get into most back yards, and the turnaround space required for a tractor would take up most of the lawn. The equipment must also be able to install the hose in the lawns with minimum impact, and in a manner that will allow the water to move laterally from the emitters in a uniform manner. ITRC will talk with practitioners that have attempted to design units in the past, to avoid historical errors.
2. Buried drip systems will be installed on 16 home lawns in San Luis Obispo (if additional funding is available from other sources the sample size will be increased). A separate water meter will be installed on each lawn system, to isolate the lawn irrigation portion of the total water bill received from the city. To qualify, each system must have had a previously installed lawn irrigation timer.

Eight of the homeowners will receive recommended schedules for irrigation of their lawns for a year. Eight of the homeowners will be told to irrigate as they see fit, to maintain a desired lawn quality. Water usage will be studied for a minimum of one year with the drip systems in place. Water records with drip will be compared against normalized (by ET and rainfall) records from previous years. Homeowner comments will be noted.

## 5. Schedule

The following is a simple bar chart for the proposed program.

SDI on Home Lawns



## 6. Monitoring and Assessment

As stated earlier, eight of the homeowners will receive recommended schedules for irrigation of their lawns for a year. Eight of the homeowners will be told to irrigate as they see fit, to maintain a desired lawn quality. Water usage will be studied for a minimum of one year with the drip systems in place. Water records with drip will be compared against normalized (by ET and rainfall) records from previous years. Homeowner comments will be noted.

## **C. OUTREACH, COMMUNITY INVOLVEMENT, AND INFORMATION TRANSFER**

### **1. Outreach**

This project will help all areas of California. It is especially targeted to the coastal areas where over-irrigation is easily lost to the ocean.

### **2. Training, Employment, and Capacity Building**

The ITRC proposal will provide training to irrigation professionals. It is estimated that about 400 persons receive training every year. The ITRC employs 30 persons. About 20 of these are students who are provided with an excellent opportunity to receive professional engineering training. This proposal will directly increase the base of students trained in irrigated landscape irrigation who will contribute professionally after graduation in improving water management in California and in the CALFED areas.

### **3. Information Dissemination**

ITRC will disseminate the results as follows:

- ITRC will work with the Water Conservation office of the City of San Luis Obispo to sponsor awareness workshops at some sites, so local people will learn about techniques and results.
- ITRC will put all information, including specifications for the construction of the installation equipment, on its web page. USBR and California DWR Water Conservation Offices will be encouraged to either provide links to this, or to duplicate the web page.
- ITRC will hold half-day workshop for city water conservation coordinators from throughout the State. If possible, this will be held in conjunction with a USBR/DWR Water Conservation Advisory Committee meeting. At this workshop, participants will learn about techniques and results. Participants will be able to use the installation equipment and examine applicable drip products.
- Two papers will be presented at State and National Conferences.
- 4 articles will be written and published in popular magazines that are read for landscape contractors, water conservation coordinators, and other interested parties.
- ITRC will respond to phone and e-mail requests for further information.

## **D. QUALIFICATIONS**

### **1. Resumes**

The resume for Dr. Stuart Styles is attached. Others who will be participating in the technical services include Dr. Charles Burt and Bob Walker. Resumes for these individuals are also attached.

### **2. External Cooperators**

There are no external cooperators scheduled for this program.

### **3. Partnerships**

This project will be coordinated with the city of San Luis Obispo.

## **E. COSTS AND BENEFITS**

### **1. Budget Summary**

The following is the estimated breakdown of the budget for 3 years. The total amount requested is **\$202,203.**

	Year 1
salaries and wages	\$101,911
fringe benefits	\$25,906
supplies	\$13,631
equipment	0
travel	\$9,800
other (direct costs)	\$50,955
<u>total</u>	<b><u>\$202,203</u></b>

Material has been promised from manufacturers to cost share for this program at a total value of **\$45,500.**

### **2. Budget Justification**



Salaries and overheads used in developing this cost estimate were based on existing contracts with the USBR and California Energy Commission and the Cal Poly ITRC

### **3. Benefit Summary.**

We anticipate that water consumption will drop by 30-60% in a year. Part of the drop will be caused by improved uniformity, part will be caused by reduced evaporation from the grass surface, and part will be caused by an improved irrigation schedule during the year. We also expect this research to provide some surprises, as usually happens with homeowner irrigation projects. Obviously, we don't know what those will be.